



# Contributions of clinical simulation versus conventional practice in a nursing laboratory in the first clinical experience

*Contribuições da simulação clínica versus prática convencional em laboratório de enfermagem na primeira experiência clínica*

*Contribuciones de la simulación clínica versus la práctica convencional en laboratorio de enfermería en la primera experiencia clínica*

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## ABSTRACT

**Objective:** to compare the perception of nursing students and the contributions of teaching with clinical simulation or conventional practical classroom skills in the first clinical hospital experience. **Method:** a descriptive, qualitative research involving undergraduate nursing students from a public university in Brazil, submitted to a high fidelity clinical simulation or conventional practical class, which took place between 2015 and 2016. For data evaluation, a word cloud and similarity analysis of the IRAMUTEQ® software were used. **Results:** Altogether 54 students participated, 27 of them in each group. The words most evoked by the simulation group were: "real patient, no, more and simulator", related to the capacity of reflection regarding their knowledge and preparation. The most evoked by the conventional practice group were: "more, no, much and feel", related with the perception that the conventional class helps in the acquisition of skills, however, more frequency is needed. **Conclusion:** Both strategies contributed positively to the first clinical hospital experience. However, the simulation provided a critical-reflexive view of skills, deficiencies and greater self-confidence in relation to conventional practice. This study strengthens the evidence of the benefits provided by simulation-based teaching, and the importance of teaching institutions making appropriate use of this strategy.

**Keywords:** Simulation Technique; Simulation Training; Students, Nursing; Learning; Teaching.

## RESUMO

**Objetivo:** Comparar a percepção de estudantes de enfermagem e as contribuições do ensino com simulação clínica ou aula prática convencional em laboratório de habilidades, na primeira experiência clínica hospitalar. **Método:** Pesquisa descritiva, qualitativa, envolvendo estudantes de graduação em enfermagem de uma universidade pública do Brasil, submetidos à simulação clínica de alta fidelidade ou aula prática convencional, ocorrida entre 2015 e 2016. Para avaliação dos dados, utilizaram-se a nuvem de palavras e a análise de similitude do software IRAMUTEQ®. **Resultados:** Participaram 54 estudantes, sendo 27 em cada grupo. As palavras mais evocadas pelo grupo simulação foram: "paciente real, não, mais e simulador", relacionadas à capacidade de reflexão quanto ao seu conhecimento e preparo. As mais evocadas no grupo prática convencional foram: "mais, não, muito e sentir", relacionadas com a percepção de que a aula convencional ajuda na aquisição de habilidades, contudo, é necessária maior frequência. **Conclusão:** As duas estratégias contribuíram positivamente para a primeira experiência clínica hospitalar. Porém, a simulação proporcionou uma visão crítico-reflexiva sobre as competências, deficiências e maior autoconfiança em relação à prática convencional. Este estudo fortalece as evidências dos benefícios proporcionados pelo ensino baseado em simulação, e a importância de instituições de ensino fazerem uso adequado dessa estratégia.

**Palavras-chave:** Simulação; Treinamento por Simulação; Estudantes de Enfermagem; Aprendizagem; Ensino.

## RESUMEN

**Objetivo:** Comparar la percepción de los estudiantes de enfermería y las contribuciones docentes con simulación clínica o clase práctica convencional en un laboratorio de habilidades, en la primera experiencia clínica hospitalaria. **Métodos:** Investigación descriptiva y cualitativa con estudiantes universitarios de enfermería en una universidad pública de Brasil, sometidos a simulación clínica de alta fidelidad o clase práctica convencional, entre 2015 y 2016. Para el análisis de los datos se utilizó una nube de palabras y el análisis de la similitud por el software IRAMUTEQ. **Resultados:** Participaron 54 estudiantes, 27 en cada grupo. Las palabras mas evocadas por el grupo de simulación fueron: "paciente real, no, más y simulador" relacionadas con la capacidad de reflexionar sobre su conocimiento y preparación. Los más mencionados en el grupo práctica convencional fueron: "más, no, mucho y sentir", relacionadas con la percepción de que la clase convencional ayuda en la adquisición de habilidades, sin embargo se necesita más frecuencia. **Conclusion:** Ambas estrategias contribuyeron positivamente para la primera experiencia clínica hospitalaria. Sin embargo, la simulación proporcionó una visión crítica reflexiva de las habilidades, deficiencias y una mayor autoconfianza en comparación con la práctica convencional. Este estudio fortalece la evidencia de los beneficios proporcionados por la enseñanza basada en simulación y la importancia de que las instituciones educativas hagan uso adecuado de esta estrategia.

**Palabras clave:** Simulación; Entrenamiento Simulado; Estudiantes de Enfermería; Aprendizaje; Enseñanza.

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Submitted on 08/04/2020.

Accepted on 12/22/2020.

DOI: <https://doi.org/10.1590/2177-9465-EAN-2020-0301>

## INTRODUCTION

Clinical practice is considered an essential and integral part of undergraduate nursing courses, because it is at this time that students apply and develop the knowledge, skills and different competencies acquired in the classroom or laboratory. It is also at the beginning of this phase that the greatest interest or rejection for the profession is observed as a result of the feelings, expectations and challenges faced.<sup>1,2</sup>

The first clinical experience is usually accompanied by high expectations and uncertainties, which can provoke positive feelings, or hinder the learning process and leave the student susceptible to sensations of incapacity, anguish, sadness, embarrassment, insecurity, anger, fear, anxiety.<sup>2</sup> This demonstrates the need for teachers to adopt methodologies that favor learning, and measures that minimize these feelings during training.<sup>3</sup>

In this context, the integration of new technologies and educational methodologies in nursing teaching practice has shown to be relevant in the evolution of the teaching and learning process. Among them, it is observed the increase in the use of clinical simulation (CS) as a teaching strategy, which has proved to be effective, because it favors the development of skills and competencies, helps in the formation of critical thinking, clinical reasoning and judgment, improves self-confidence and student satisfaction. It also contributes to patient safety and allows the facilitator to apply a variety of clinical cases in a practice setting similar to the real one, before contact with the patient.<sup>4-8</sup>

Student satisfaction is paramount for maintaining a good learning environment and indispensable for skills development through simulated practice.<sup>6,9-11</sup> Cognitive improvement related to satisfaction is an essential component of academic motivation and important indicator in the perception of learning.<sup>12</sup>

In the last decade, national and international studies show that simulation training improves the development of clinical competence, causes epistemological curiosity, reduces insecurity and the occurrence of adverse events caused during clinical training.<sup>13,14</sup>

Although international studies show strong evidence on the benefits of using clinical simulation, additional studies are needed to understand the effects of this teaching strategy on the Brazilian reality. The objective of this study was to know the perception of nursing students and the contributions of the use of high fidelity clinical simulation, comparing it with the conventional practical class in a skills lab and after the first clinical experience in a hospital setting.

## METHOD

It is a descriptive research, of qualitative approach that compared the perception of nursing students submitted to the clinical simulation of high fidelity, with that of students that participated of conventional practical class in laboratory of abilities.

The sample was composed of students from the fourth period of nursing undergraduate at a public university in southern Brazil, between the months of August 2015 and September 2016. The

researcher made the invitation to participate in the research personally, in class, at the beginning of the school semester, when he explained his objectives and clarified the existing doubts.

Inclusion criterion was considered to be: being enrolled in the discipline of fundamentals to care in nursing. The exclusion criteria were: training in another graduation course in the health area with competence for physical examination, or training of auxiliary/technician in nursing; students with lock history or disapproval in the referred discipline.

The data collection took place in two moments: after the practical classes in a skills lab or high-fidelity clinical simulation laboratory; and in a hospital environment after the first clinical experience with patients. The theoretical-practical content involved anamnesis and cardiothoracic physical examination. Prior to the data collection, the students were again guided on the objectives of the research, and participated in a theoretical class regarding the theme applied by the professor of the subject, together with the main researcher.

After the signing of the Free and Informed Consent Term (FICT), the principal researcher created a random list with the names of the students. In the sequence, the randomization function was used-in the Microsoft Excel® program. Participants were included one by one, and the program allocated them to the Conventional Practice Classroom Skills Group (CPG) or the Clinical Simulation Group (CSG).

CPG - the participants took the anamnesis and physical examination in another student chosen by them according to the degree of affinity. The skills class followed the script established in the lesson plan, by the teacher responsible for the subject. The skills involved pulse evaluation, arm circumference, blood pressure measurement at rest and in activity, cardiac auscultation and chest evaluation.

CSG - a high fidelity clinical simulation scenario was developed according to the National League of Nursing/Jeffries<sup>15</sup> simulation model. The participants were to care for a patient with chest pain who was admitted to an infirmary bed. The main objective was to perform anamnesis and physical examination with cardiorespiratory focus. The simulation involved five minutes for the briefing. The participants received guidance regarding the ethical and confidentiality issues of the CS, and that the CS was not a criterion for the evaluation of the discipline; they knew the environment, the functionalities of the simulator and received the history and the patient's chart. The scenario lasted fifteen minutes, and the METIman® high-fidelity simulator was used. At the beginning of the scenario, the patient was lying in bed, awake and with vital signs within normality. After the students performed the anamnesis and evaluation of auscultation, frequency and heart rhythm, and blood pressure, the patient complained of malaise and requested a new evaluation. At that time, the heart rate and blood pressure were altered. The structured debriefing was performed by the principal investigator and lasted 30 minutes.

Before the simulation, the academics developed skills laboratory practices, as practiced by CPG. The different teaching strategies with the groups were executed in consecutive days,

in order to avoid possible communication interferences. The first clinical experience occurred on the same day for both groups, at a public school hospital, in the male and female medical clinic, surgical clinic, neurological clinic, and in the inpatient sector of an Emergency Care Unit (ECU).

The two groups answered three written questions about the teaching strategy used and their contribution to the first contact with the patient: "How was the experience of this class for you?"; "Do you feel prepared (a) for your first clinical experience with a real patient?"; "Do you consider that the laboratory or simulation class facilitated your first contact with the patient? Why?"; "Do you feel ready for your first clinical experience with a real patient?".

The questions were elaborated by the principal researcher together with the professor of Fundamentals for Nursing Care. In order to guarantee the privacy of the participants, an alphanumeric code was chosen, where "A" corresponds to the student.

After the end of the data collection, the CPG was offered a simulation class similar to that of the CSG, in order to make possible a similar experience for all and to avoid possible losses.

For data analysis, the software IRAMUTEQ® (*Interface de R pour les Analyses Multidimensionnelles de Textes et de Questionnaires*) 0.7 alpha 2, developed by Pierre Ratinaud,<sup>16</sup> was used. The text corpus was built from the grouping of each student's answers to the three questions, which were coded by letters and numbers. Analysis by "word cloud" and "similarity analysis"<sup>16</sup> were carried out. The cloud organizes and graphically groups the words according to the frequency with which they appear in the corpus. Similarity analysis presents the words according to their textual connections and allows for the identification of co-occurrences.

The study was approved by the Research Ethics Committee of a federal university in the south of the country, in March 2015, under no. 1,002,176 - according to the criteria defined by Resolution no. 466/12 of the National Health Council.

## RESULTS

Fifty-four students out of a total of 63 eligible agreed to participate in the survey, with 27 initially allocated to each group. After data collection began, two CPG participants were excluded; one due to withdrawal from the course before the first clinical experience and the other for not answering one of the questions. The average age of CSG was 20.32 ± 1.79 years and of CPG, 21.11 ± 2.47 years. The predominant gender for both groups was female (85.19% - CSG; 92.00% - CPG). As for previous experiences with clinical simulation, 100% of the participants reported never having participated in simulation.

Table 1 shows the numerical results of the analysis of the textual corpora of both groups.

When analyzing the word clouds obtained by the participants' responses (Figure 1), we found that the most evoked by the CSG were: "real patient, no, more and simulator" with 55, 48, 45 and 42 occurrences, respectively. These words correspond to the moment of reflection and learning that the students had when experiencing the simulation.

*In the simulator we could train the personal presentation that with colleagues does not work properly, the simulator also made me prepare for improvisation, answer questions of the real patient and improve this interaction. (A6);*

*The high fidelity simulator provided a moment of reflection regarding my attitudes towards the real patient and the team as well as my way of acting in the face of my difficulties. (A48);*

*No, I would need to train more often to feel more prepared to interact with the real patient. (A27)*

In CPG the most observed occurrences were: "more, no, much, and feel", with 40, 31, 25 and 24 times. Despite not having experienced the simulation, CPG considered the conventional practical class a moment of preparation for the first clinical experience, which also generated confidence and safety, in addition to the perception of the need to improve knowledge:

*I feel that things are not difficult, but that it takes practice. (A8);*

*Learning and practicing with classmates makes it easier to get in touch with the real patient, I felt safe because I had already had the experience of examining someone even if they are not a patient. (A13);*

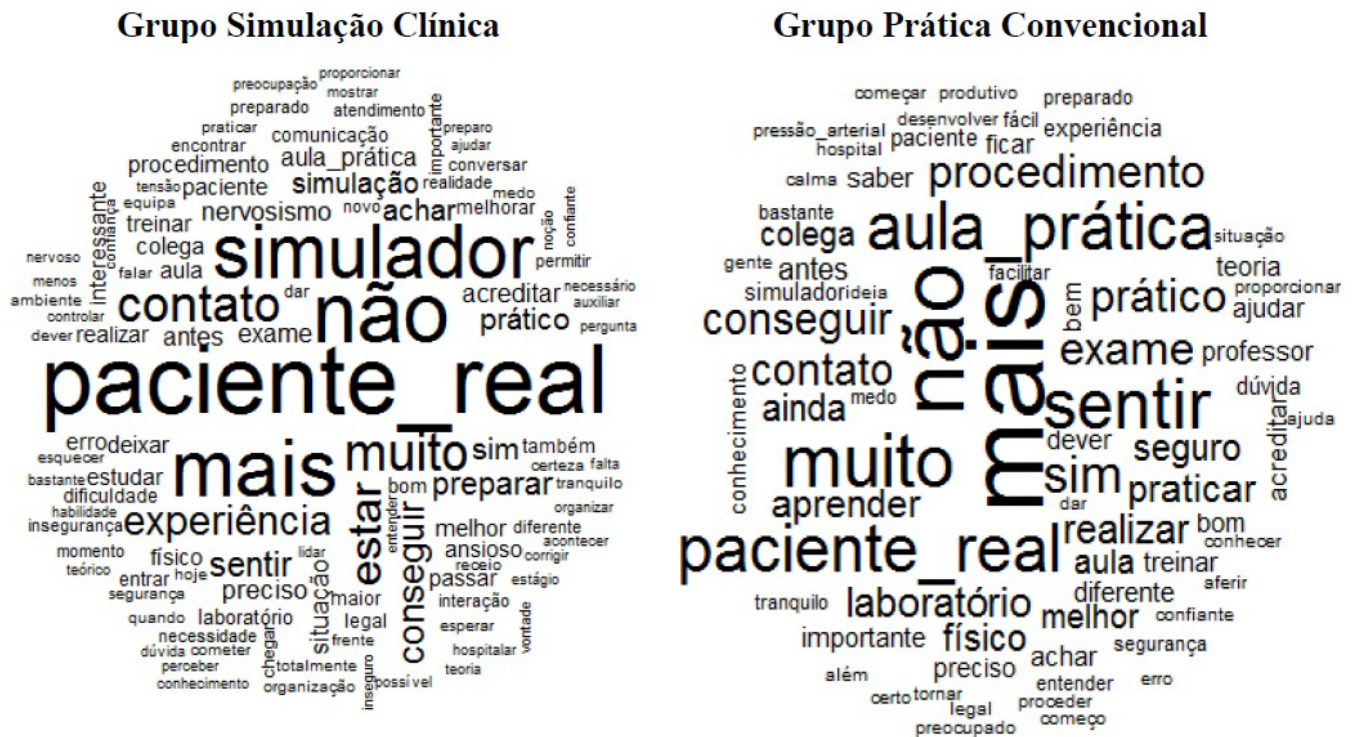
*...I feel I need more practical and theoretical lessons before attending a real patient. (A17);*

The CSG tree of similarity (Figure 2) presented four main lexical items: "real patient, no more, simulator", and the term "real patient" presented a higher number of connectivity. Words such as "experience, preparation, training, achieving, allowing, organizing and contacting" have proximity to the expression "real patient". The word "more" has connection with "real patient and simulator" and strong and close connections with the terms "accurate, real, confident, class, believe, situation and nervousness".

**Table 1.** Results of textual corpora analysis.

	Clinical Simulation Group	Conventional Practice Group
Number of texts	27	25
Number of text segments	70	54
Occurrences	2578	1818
Number of ways	649	509
	361	295
Hapax number	55.62% of the ways	57.96% of the ways
	14.0% of the occurrences	16.23% of the occurrences

Source: The authors (2017). Key



**Figure 1.** Comparison of the word cloud of the groups' corpora. Curitiba, PR, Brazil, 2017. Note: Image generated by software not being possible to maintain the original image after translation. Keywords: Clinical Simulation Group - Real\_patient; no; more; simulator. Conventional Practice Group - More; no; much; feel; practice\_class; patient\_real. Source: The authors (2017).

The lexical item “simulator” is on the periphery of the term “real patient”; however, it has strong affinities with the words “interesting, practical class, colleague, error, being, nervous, cool and difficult”. At the CSG, the lexical item “no” has strong connectivity with “real patient” and proximity to the words “prepared, interaction, much, duty, good”, among others.

For the CSG, the experience with the simulator is considered positive, since it is very close to reality, and prepares for the care of the real patient, as evidenced in the lines: *It was very good due to interaction, communication and believing that the simulator is a real patient. (A2); It was a very important experience for the interaction with the real patient; I believe that this simulation gives us the idea of what the contact in the hospital will be like... (A35).*

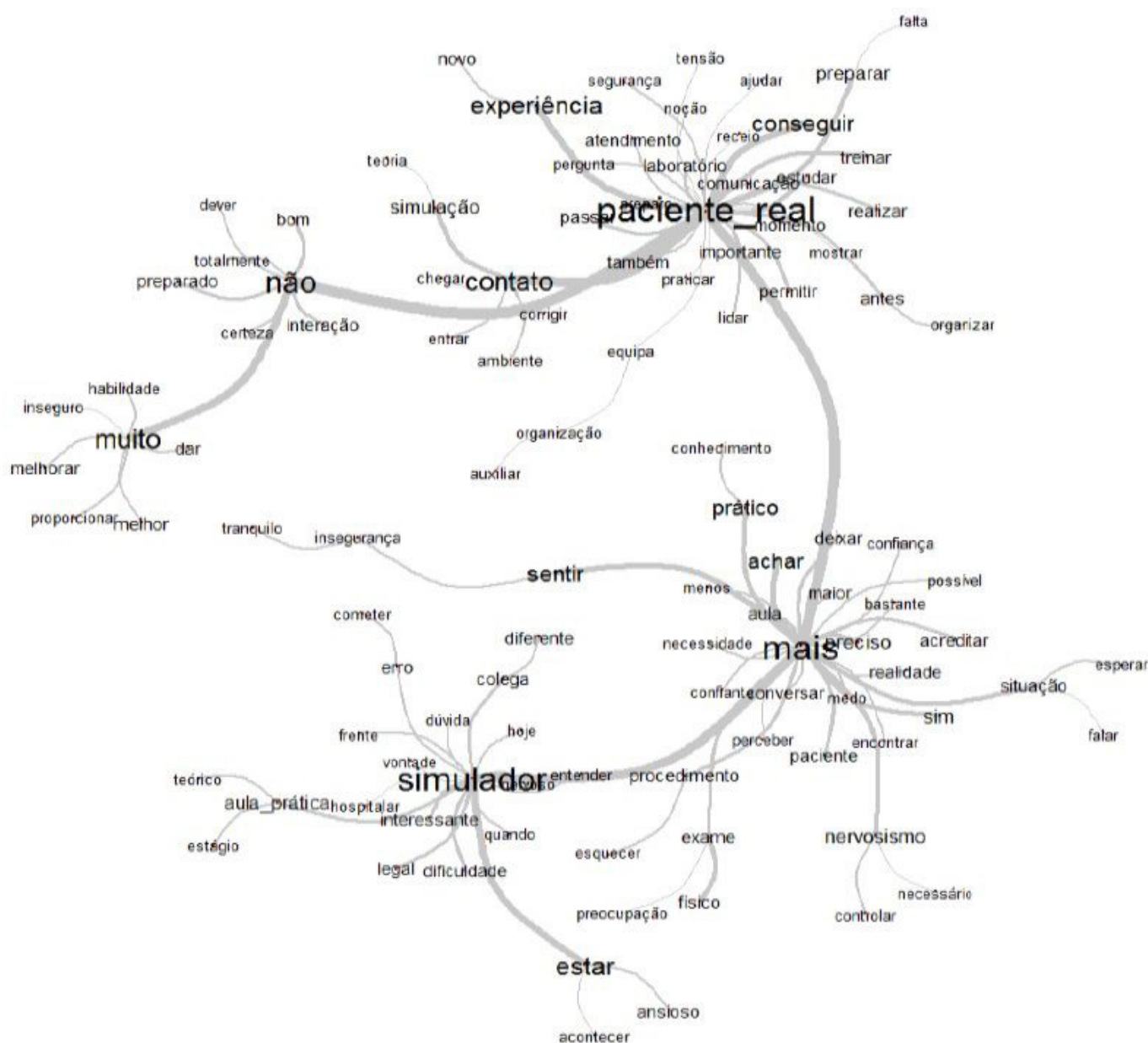
The words “no and more” are related to the student’s capacity for reflection and self-perception about his/her knowledge and preparation, before the first contact with the patient in the hospital environment. *I don’t feel prepared yet, I feel that I need to fix more the knowledge acquired in classes, train more... (A19); [...] No, I must change and correct many things in order to correctly attend the real patient” (A28). [...] the simulator brings experiences to the student that perhaps he did not think before that he could pass before the real patient (A53).*

When analyzing the term simulator, words such as “experience, interesting, cool, anxious and reality” are closer. Because it is

new the simulation may have caused anxiety in students, but despite this feeling, the experience was considered as positive: *[...] I found a new experience very interesting and I was a little anxious... (A28); [...] the practical class is very productive because you can hear what is happening and relate to the theoretical class. In the simulator I found it very interesting although before I felt a little anxious and nervous (A11).*

The term “real patient” has direct connectivity with the word “simulator”, but also has a connection with terms such as “communication, training, preparing and allowing”. For learners, the simulation provides a close experience to what will be found in the first contact with the actual patient, in addition to helping in training, facilitating communication and error correction: *[...] this experience made it easier for me to have the first contact with the real patient, you can see that some of my shortcomings that were identified during the class with the simulator, were my strong points today (first clinical hospital experience) (A21).*

The lexical item “no” is due to the question about feeling prepared for the actual patient care. At the CSG, the simulator allowed us to understand the difficulties and the need to deepen the theoretical contents and laboratory classes before the first clinical experience, as evidenced in the report: *reality shock, the experience was reflected to the simulator; the nervousness and fear of not knowing what to do left me in panic. No, more*



**Figure 2.** Clinical Simulation Group Similitude tree. Curitiba, PR, Brazil, 2017. Note: Image generated by software not being possible to maintain the original image after translation. Keywords: Patient\_real (paciente real); more (mais); simulator (simulador); contact (contato); no (NãO); much (muito); being (estar)  
Source: the authors (2017)

*preparation is needed both theoretical and practical, more practical class (A36).*

The lexical item “more”, presented a direct connection with the word “simulator”, and has in its surroundings several words, such as “confidence, precise, prepared, enough, leave and nervousness”. In the analysis of the corpus, we observed that students feel that the simulator prepares and gives more confidence in doing; however, it also causes nervousness, since, as said before, it is a new experience

and has highly real characteristics: [...] *I believe that if the simulation was implemented in the practical class, the students would arrive on the first day of stage more confident (A5); I think I need to control my nervousness more, my technique; the experience with the simulator offered me a certain experience of what it would be like today (first clinical hospital experience), because on the day of the simulator the nurse and teacher pointed out our mistakes and today I have already corrected them (A28).*

### Clinical simulation versus conventional practice

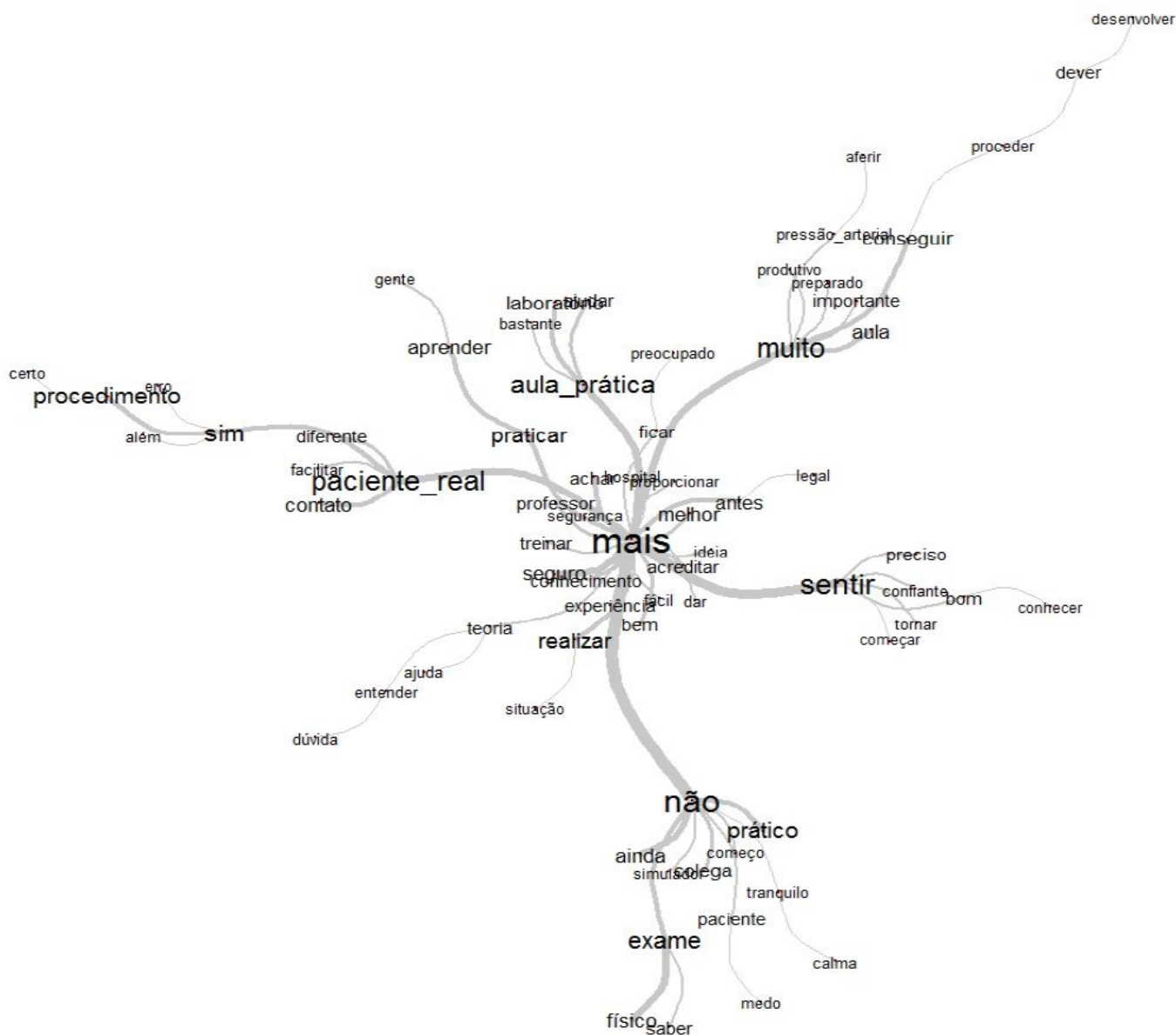
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The CPG similarity analysis (Figure 3) presented three main lexical items: “more, practical class and real patient”. Of these, the term “more” showed the largest number of connections. Several words have a connection very close to the word “more”, among them “practice, teacher, learn, feel, safety, colleague, easy”.

The lexical item “more” appears as the main axis with the greatest number of connectivity. The strongest and most found in the periphery are the terms “no, feel, a lot, practical and real patient”, and each of them has strong connections with other terms. In the strongest links with the word “more” are the words “safe, knowledge, teacher, practice, experience, before, better, train, accomplish”, among others.

Next to the word “no” are the terms “practical, colleague, still, exam”, among others. The lexical item “to feel” has a direct connection with the terms “precise, confident, good, to know, to become and to begin”. “A lot” is directly connected to “productive, prepared, important, getting and teaching”. “Practical class” has connections with “enough, laboratory and care”. Finally, the term “real patient” has strong connectivity with “yes, contact, easy and different”.

For CPG, the term “more” brings the meaning of quantity and intensity, pointing out that the conventional practical class in the laboratory helps in the acquisition of skills necessary for safe patient care. The student feels comfortable, because he



**Figure 3.** Conventional Practice Group Similitude Tree. Curitiba, PR, Brazil, 2017. Note: Image generated by software not being possible to maintain the original image after translation. Keywords: Patient\_real (paciente real); more (mais); simulator (simulador); contact (contato); no (Não); much (muito); feeling (sentir)  
Source: the authors (2017)

counts on the direct presence of the teacher, who helps him and demonstrates how to do the procedures. Moreover, they train each other, and the friendly relationship favors a calm environment.

The amount of practical class in laboratory interferes directly in the confidence of the students: *The practical class provided a better vision for the physical exam, but I still don't feel safe to do the procedures, I believe that with more practical class this reality changes... (A8); ... training with the colleague is easier and they also have the teachers at their side (A37). The lexical item "practical classroom" makes connections with the words "important, help, get", among others: The practical class was important because we can learn and practice on each other before having contact with the real patient... (A16).*

The lexical item "real patient" presented connectivity with the words "different, knowledge and contact". In analyzing these connections, we observe that students recognize that there is a difference between learning by examining colleagues and examining the real patient: *I didn't go to class with the simulator but with a colleague. And it was very different, because my colleague, I always see and have a little intimacy; already with the real patient no (A6); ... doing exams in the laboratory is very different than doing it with a real patient with pain (A37).*

## DISCUSSION

The insertion of the nursing student in the field of clinical practice is accompanied by difficulties in the association between theory and practice, as reported by them, following the example of the practical activities little experienced and little effective. In addition, the students demonstrate anxiety and the feeling of not having learned enough to experience the clinical practice.<sup>17</sup> This fact was evidenced in this research by both groups; however, it was observed that the students who participated in the simulation were able to reflect on their real knowledge and skills, perceiving the points to be improved and understanding the importance of reviewing the content and developing skills before the first clinical experience.

Among the factors that contribute to the safety or insecurity of the nursing graduate during the first clinical experiences, the number of practical classes appears as one of the main indicators that impact the self-confidence of the student.<sup>18</sup> As pointed in this research, they realized - besides the need of more practical classes - the difference that exists when the training is accomplished between colleagues and with simulators. The latter bring realism and are much closer to clinical practice, besides favoring the development of communication skills and the correction of errors before contact with the patient.

A descriptive cross-sectional study, using clinical simulation after the theoretical lesson, found that students considered the influence of simulated teaching on the learning process to be strong. They agreed that simulation can be used to increase self-confidence, and recommended simulated practice to other students,<sup>19</sup> corroborating the findings of this research in relation to increasing confidence, when using such a strategy before the first clinical experience.

Compared to conventional teaching, the simulation presents advantages in the transition to clinical practices, with greater satisfaction and self-confidence of the students<sup>(19,20)</sup>. Self-confidence is an important element for quick decision making by the nurse; more confident, the student becomes able to solve problems effectively which minimizes the possibility of errors in a real patient.<sup>20-22</sup>

A study conducted in Turkey, involving 227 undergraduate nursing students, compared conventional pediatric teaching with simulation-based teaching, and found that the levels of self-efficacy perceived by students who participated in this type of teaching were significantly higher. The authors also noted that simulation increased practical skills related to clinical evaluation and hygiene care and medication administration in pediatrics by the students.<sup>22</sup>

Clinical simulation assists in critical-reflexive training and competence development, through the integration between theory and practice, error identification, failure recognition and motivation to evolve in the teaching-learning process.<sup>23,24</sup> The satisfaction of students with the simulation strategy is reported in the literature as indispensable for the success of this method, as it is associated with greater involvement with the learning process, making the student active in the construction of knowledge.<sup>25</sup>

Although evidence shows that simulation has several advantages over other teaching strategies, it is observed that it also provokes feelings of stress and anxiety in students, which can compromise learning.<sup>26,27</sup> Such data was also found in this research. While the conventional group reported the practice in the laboratory with colleagues as a friendly and quiet environment, the students who experienced the simulation reported feelings of nervousness and anxiety during the scenario. These feelings may be related to the new moment, the insecurity about the skills needed to perform the scenario and its realism. Therefore, it is important that, when designing the simulation scenarios, teachers be attentive and look for ways to minimize these feelings.

The literature recommends: scenarios suited to the level of knowledge and skills of students; clear guidance on the objectives of the scenarios; enough time to recognize the environment and materials; reduced number of participants in each scenario, when possible; guaranteed privacy; and preference for remote observation by teachers and facilitators when the simulation is an evaluation moment.<sup>28</sup>

Despite the advantages brought by this comparative study, it is essential to emphasize that clinical simulation is not intended to replace conventional teaching, but to complement it. This strategy is an important tool for the integration between theory and practice, which allows the student to have an interactive and safe clinical experience and corroborates the trends of hybrid teaching construction, using multiple learning methods.<sup>29</sup>

Some limitations should be considered: the participants performed only a simulation scenario before the first clinical experience; the skills lab class and the CS scenario involved only the cardiothoracic physical examination theme, which is part of the Nursing Care Basics subject. However, in the first clinical

experience, the content applied corresponds to the complete anamnesis and physical examination.

## CONCLUSION

In the students' perception, both strategies contributed positively to the first clinical experience with the real patient. However, the high-fidelity clinical simulation allowed learning in a controlled environment and without risks to the patient, in a scenario very close to the real thing. It also contributed to the formation of a critical-reflexive view of their own competencies, the recognition of their limitations, and the understanding of the importance and necessity of obtaining consistent theoretical knowledge to ground the practice.

This study strengthens the evidence of the benefits provided by simulation-based teaching, and the importance of educational institutions making appropriate use of this pedagogical strategy.

## AUTHORS' CONTRIBUTIONS

Study design. Radamés Boostel. Carina Bortolato-Major. Jorge Vinícius Cestari Felix.

Coleta ou produção dos dados. Radamés Boostel.

Data analysis. Radamés Boostel. Nilton Orlando da Silva. Amanda Carolina de Oliveira Bialetski Fontoura. Jorge Vinícius Cestari Felix.

Interpretation of results. Radamés Boostel. Nilton Orlando da Silva. Jéssica de Oliveira Veloso Vilarinho. Amanda Carolina de Oliveira Bialetski Fontoura. Jorge Vinícius Cestari Felix.

Writing and critical revision of the manuscript. Radamés Boostel. Carina Bortolato-Major. Nilton Orlando da Silva. Jéssica de Oliveira Veloso Vilarinho. Amanda Carolina de Oliveira Bialetski Fontoura. Jorge Vinícius Cestari Felix.

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Responsibility for all aspects of the content and integrity of the article published. Radamés Boostel. Carina Bortolato-Major. Nilton Orlando da Silva. Jéssica de Oliveira Veloso Vilarinho. Amanda Carolina de Oliveira Bialetski Fontoura. Jorge Vinícius Cestari Felix.

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